**Biospectra : ISSN : 0973-7057, Vol. 15(1), March, 2020, pp. 307-310** **31(AS).**
*An International Biannual Refereed Journal of Life Sciences* ***Animal Science***

ISSN : 0973-7057

Int. Database Index: 663 www.mjl.clarivate.com

# Portfolio function of fresh water crabs engineered by S-W Diversity index in the Kanwar lake, Begusarai, Bihar, India

**Mousumi Dey***
Department of Zoology, B.N Mandal University, Madhepura, Bihar, India

*Received : 22nd January, 2020 ; Revised : 27th February, 2020*

**Abstract:** Portfolio function of any biotic population in an ecosystem has multidimensional control & is primarily engineered by S-W diversity index of the species. S-W diversity index is popular statistical information index as quantitative tool to quantify the species abundance, richness & bifold product value of any species that yields significant result for understanding their asset & liability value in the portfolio of biotic community. It further helps in contemplating the strategies for the management & development of sustainable environment & ecosystem. Fresh water crabs being the members of crustacean arthropods have distinct role in the wetland habitats where they successfully dwell, propagate & contribute in the portfolio of the community. Crabs sampled from the Kanwar lake of Begusarai were taxonomically identified as nine different species like-*Barytelphusa cunicularis, Barytelphusa guerini, Barytelphusa lugubris, Inglethelphusa fronto, Paratelphusa masoniona, Paratelphusa spinigera, Potamon lugubre, Sartoriana spinigera & Vanni travancorica*. Random sampling data of these nine species in terms of their per unit net sweep numerical count were recorded as species abundance ($p_i$)- an important asset of the wetland community portfolio accommodating these crabs. When the data were subjected to S-W diversity index tool on the basis of the species abundance, the value of H (H= -$\sum$pi x log pi) for all the species of crabs present in the sixty random sampling sites was found in the range of 0.8301-0.8927 during different seasons which indicate that they have profitable asset investment contribution (PF index ranging between 6.523-10.081) as edible as well as other beneficial resource in the community as per portfolio function laws.

**Key words: S-W diversity, portfolio function index (PFI), freshwater crabs, profitable asset investment, edible resource, Kanwar lake**

## INTRODUCTION

Fresh water crabs are among the most important invertebrates inhabiting all the freshwater habitat, large lowland rivers and small water bodies.[1] There are more than 1300 species, 238 genera and eight families of freshwater crabs distributed across tropical and subtropical Asia, Africa, Central and South America, southern Europe, the Middle East and Australasia.[2,3] More than 6,700 different known species of brachyuran crabs and over 1,300 true freshwater crabs have been identified around the world. The true freshwater crabs are fully adopted for freshwater, semi-terrestrial or terrestrial appears of life. Most these crabs are found to be nocturnal scavengers or opportunistic predators, and some species have economic and ecological importance. For example, some species are rice field pests, some are a source of protein for people, and other species have medical importance serving as the second intermediate host of the parasitic human lung fluke, Paragonimus. These crabs also have a great medicinal

*Corresponding author :
Phone : 7903035949
E-mail : m5284banty@gmail.com

value and play a very important role in aquatic ecosystem.[4,5] Some species of freshwater crabs also serve as bio-indicators of ecosystem disruption; some are threatened by collection for the aquarium trade etc. Freshwater crabs inhabit in tropical and subtropical areas in many parts of the world. They can be caught in most freshwater ecosystems, from fast flowing mountain streams to slow flowing rivers, streams, stagnant ponds etc. At present crabs have become one of the important source for the establishing the fishery wealth in many countries.[6]

## MATERIAL AND METHODS

For the study of portfolio function of freshwater crab as an important statistical exercise, collection of the samples were done from sixty different sites of the Kanwar lake of Begusarai during morning hour between 10 am - 12 pm in four different seasons during 2016-2017. The crabs were sampled from a statistically valid number of randomly selected sites as mentioned rather than surveying the entire water body. Specimen were collected using aquatic net & were preserved in 5-10% formalin in plastic container which were then carried to the Department of Zoology, B.N Mandal university for its taxonomical identification with the help of different keys suggested by various scientists.[7,8,9] Analysis of portfolio function on the basis of random sampling data through calculation of S-W diversity index has been presented in table 1-4. The equations used for S-W diversity(H) & Portfolio function index (PFI) are as follow:-

$$H = -\Sigma pi * \log pi$$

$$PFI = V_{water}/H$$

**Table 1: Portfolio function of freshwater crab of Kanwar lake during rains 2016.**

| Si. No. | Name | n | Per CFT volume of water in each sweep | Relative abundance %(n/N* 100) | pi(n/N) | log pi | pi*log pi | H | PF index(volume of water as host resource/diversity of crabs H,$V_{water}$/ H) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | *Sartoriana spinigera* | 82 | 9 | 21.2 | 0.212 | -0.673 | -0.1426 | | |
| 2 | *Barytelphusa guerini* | 16 | 9 | 4.1 | 0.041 | -1.387 | -0.0568 | | |
| 3 | *Barytelphusa lugubris* | 22 | 9 | 5.6 | 0.056 | -1.251 | -0.0700 | | |
| 4 | *Inglethelphusa fronto* | 48 | 9 | 12.4 | 0.124 | -0.906 | -0.1123 | | |
| 5 | *Paratelphusa masoniona* | 65 | 9 | 16.8 | 0.168 | -0.774 | -0.1300 | **0.8927** | **10.081** |
| 6 | *Paratelphusa spinigera* | 43 | 9 | 11.1 | 0.111 | -0.954 | -0.1058 | | |
| 7 | *Potamon lugubre* | 62 | 9 | 16 | 0.160 | -0.795 | -0.1272 | | |
| 8 | *Barytelphusa cunicularis* | 28 | 9 | 7.2 | 0.072 | -1.142 | -0.0822 | | |
| 9 | *Vanni travancorica* | 20 | 9 | 5.1 | 0.051 | -1.292 | -0.0658 | | |

**Table 2: Portfolio function of freshwater crab of Kanwar lake during winter 2016.**

| Si. No. | Name | n | Per CFT volume of water in each sweep | Relative abundance %(n/N* 100) | pi(n/N) | log pi | pi*log pi | H | PF index(volume of water as host resource/diversity of crabs H,$V_{water}$/ H) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | *Sartoriana spinigera* | 65 | 5.8 | 23.7 | 0.237 | -0.625 | -0.1481 | | |
| 2 | *Barytelphusa guerini* | 10 | 5.8 | 3.6 | 0.036 | -1.443 | -0.0519 | | |
| 3 | *Barytelphusa lugubris* | 16 | 5.8 | 5.8 | 0.058 | -1.236 | -0.0716 | | |
| 4 | *Inglethelphusa fronto* | 30 | 5.8 | 10.9 | 0.109 | -0.962 | -0.1048 | | |
| 5 | *Paratelphusa masoniona* | 40 | 5.8 | 14.5 | 0.145 | -0.838 | -0.1215 | **0.8301** | **6.9871** |
| 6 | *Paratelphusa spinigera* | 32 | 5.8 | 11.6 | 0.116 | -0.935 | -0.1084 | | |
| 7 | *Potamon lugubre* | 55 | 5.8 | 20 | 0.200 | -0.698 | -0.1396 | | |
| 8 | *Barytelphusa cunicularis* | 15 | 5.8 | 5 | 0.054 | -1.267 | -0.0684 | | |
| 9 | *Vanni travancorica* | 11 | 5.8 | 4 | 0.040 | -1.397 | -0.0158 | | |

**Table 3: Portfolio function of freshwater crab of Kanwar lake during autumn 2016.**

| Si. No. | Name | n | Per CFT volume of water in each sweep | Relative abundance %(n/N* 100) | pi(n/N) | log pi | pi*log pi | H | PF index(volume of water as host resource/diversity of crabs H,$V_{water}$/ H) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | *Sartoriana spinigera* | 60 | 5.5 | 26.9 | 0.269 | -0.570 | -0.1533 | | |
| 2 | *Barytelphusa guerini* | 8 | 5.5 | 3.5 | 0.035 | -1.455 | -0.0509 | | |
| 3 | *Barytelphusa lugubris* | 11 | 5.5 | 4.9 | 0.049 | -1.309 | -0.0641 | | |
| 4 | *Inglethelphusa fronto* | 23 | 5.5 | 10.3 | 0.103 | -0.987 | -0.1016 | | |
| 5 | *Paratelphusa masoniona* | 32 | 5.5 | 14.3 | 0.143 | -0.844 | -0.1206 | **0.8428** | **6.5258** |
| 6 | *Paratelphusa spinigera* | 25 | 5.5 | 11.2 | 0.112 | -0.950 | -0.1064 | | |
| 7 | *Potamon lugubre* | 48 | 5.5 | 21.5 | 0.215 | -0.667 | -0.1434 | | |
| 8 | *Barytelphusa cunicularis* | 9 | 5.5 | 4 | 0.040 | -1.397 | -0.0558 | | |
| 9 | *Vanni travancorica* | 7 | 5.5 | 3.1 | 0.031 | -1.508 | -0.0467 | | |

**Table 4: Portfolio function of freshwater crab of Kanwar lake during summer 2016.**

| Si. No. | Name | n | Per CFT volume of water in each sweep | Relative abundance %(n/N* 100) | pi(n/N) | log pi | pi*log pi | H | PF index(volume of water as host resource/diversity of crabs H,$V_{water}$/ H) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | *Sartoriana spinigera* | 30 | 4.5 | 34.8 | 0.348 | -0.458 | -0.1593 | | |
| 2 | *Barytelphusa guerini* | 2 | 4.5 | 2.3 | 0.023 | -1.638 | -0.0376 | | |
| 3 | *Barytelphusa lugubris* | 4 | 4.5 | 4.6 | 0.046 | -1.337 | -0.0615 | | |
| 4 | *Inglethelphusa fronto* | 1 | 4.5 | 1.1 | 0.011 | -1.958 | -0.0215 | | |
| 5 | *Paratelphusa masoniona* | 14 | 4.5 | 16.2 | 0.162 | -0.790 | -0.1279 | **0.7561** | **5.9515** |
| 6 | *Paratelphusa spinigera* | 12 | 4.5 | 13.9 | 0.139 | -0.856 | -0.1189 | | |
| 7 | *Potamon lugubre* | 18 | 4.5 | 20.9 | 0.209 | -0.679 | -0.1419 | | |
| 8 | *Barytelphusa cunicularis* | 3 | 4.5 | 3.4 | 0.034 | -1.468 | -0.0499 | | |
| 9 | *Vanni travancorica* | 2 | 4.5 | 2.3 | 0.023 | -1.638 | -0.0376 | | |

## RESULT AND DISCUSSION

From the above findings nine different species of fresh water crab has been found which includes *Sartoriana spinigera, Barytelphusa guerini, Barytelphusa lugubris, Inglethelphusa fronto, Paratelphusa masoniona, Paratelphusa spinigera, Potamon lugubre, Barytelphusa cunicularis & Vanni travancorica* maximum of which included those which were generally taken up by the people of that region. The data regarding the portfolio function of the freshwater crab were found to be 10.081, 6.9871, 6.5258 & 5.9515 that shows the presence of rich PF index level of the aquatic community in this area regardless the volume of water used for each sweep. Rise in the PF index of the aquatic community may be due to the abundance of availability of micro flora and fauna in that habitat. Therefore availability of flora and fauna in this volume of water also needs to be examined in deciding the PF index level of the habitat.

## ACKNOWLEDGEMENT

Author is very much thankful to the Head of Dept of Zoology, B.N Mandal University & her guide Dr. Pankaj Kumar, Associate Prof., P.G Dept. of Zoology, T.P College Madhepura to provide the necessary facilities to carry out the research work successfully.

## REFERENCES

1. **Yeo, D.C.J, P.K.L. Ng, N. Cumberlidge, C. Magalhães, S.R. Daniels & M.R. Campos. 2008.** Global diversity of crabs (Crustacea: Decapoda: Brachyura) in freshwater. *Hydrobiologia*, **595:** 275-286.

2. **Ng, P.K.L., D. Guinot & P.J.F. Davie. 2008.** Systema Brachyurorum. Part I. An annotated checklist of extant brachyuran crabs of the world. *Raffles Bull. Zool. Suppl*., **17:** 1-286.

3. **Cumberlidge, N., P.K.L. Ng, D.C.J. Yeo, C. Magalhães, M.R. Campos, F. Álvarez, T. Naruse, S.R. Daniels, L.J. Esser, F.Y.K. Attipoe, F.L. Clotilde-Ba, W. Darwall, A. Mcivor, M. Ram & B. Collen. 2009.** Freshwater crabs and the biodiversity crisis: importance, threats, status, and conservation challenges. *Biol. Conserv.,* **142:** 1665-1673.

4. **Cobb BF, Conte FS, Edwards MA. 1975.** Free Amino Acids and Osmoregulation in Penaeid Shrimp. *J Agric Food Chem* **23:** 1172-1174.

5. **Fang LS, Tang CK, Lee DL, Chen IM. 1992.** Free Amino Acid Composition in Muscle and Hemolymph of the Prawn *Penaeus monodon* in Different Salinities. *Nippon Suisan Gakkaishi*. **58:** 1095-1102.

6. **Chhapgar B. 1991.** Seashore Life of India. Nature Guides, Oxford University Press, *Bombay India*. 18-24

7. **Shafi, M. and Quddus, M. M. A. 1982.** Fisheries Resources in Bangladesh. (Bangladesher Matshaya Sampad, in Bengali), Bangla Academy, Dhaka, pp 369-396

8. **Chowdhury, S.H. and Hafizuddin, A.K.M. 1991.** Crab Fauna of Bangladesh. Part-I. Some marine crabs from the Bay of Bengal. Chittagong University Studies. Part-II, *Science.* **2(15):** 65-77

9. **Siddiqui M.Z. H. and Zafor, M. 2002.** Crabs in the Chakaria Sundarban are of Bangladesh. *The Journal of NOAMI*. **19 (2):** 61-75.

***